

PROGRESS REPORT #1
UNIVERSITY OF TENNESSEE AGRICULTURAL REMOTE SENSING
DECEMBER 27, 1972

E7.2-10320

NTIS HC \$3.00

CR-129578

- (a) PROJECT TITLE: Utilization of ERTS data to detect plant diseases and nutrient deficiencies, soil types and moisture levels.

PI - W. L. Parks (Soils)
COI - J. I. Sewell (Soil moisture)
- J. W. Hilty (Plant diseases)
- J. C. Rennie (Forestry)

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- (b) GSFC ID UN650 MMC #139

Technical Monitor - George J. Ensor
Scientific Monitor - W. T. Escue
Contracting Officer - J. D. Medwin

- (c) The main problem encountered thus far was one of timing and personnel. Final notification of project acceptance was not received until late October and finding graduate research assistants capable of this type investigations has caused some delays. One M.S. candidate, recently returned from military service has been obtained and will devote full time to this project for the next six months. A portion of his time will be utilized after that period. A graduate assistant in Forestry has been obtained and it is hoped that another research assistant in the plant and soil area will be added in the near future.

Most of the imagery received is good but Channel 6 probably had some malfunction around 13 September, 1972.

- (d) Accomplishments to date include visual examination of imagery, isolation of selected points for intensive study and obtaining more ground data relative to these points of interest.

Initial scans by the Tech/OPS scanning microdensitometer of all four channels of selected areas on four sets of imagery have been completed and some of these evaluated through the IBM 360/65 computer. Each channel of each set of imagery was scanned at 25, 50 and 100 microns. Initial printouts from these evaluations indicate need for some refinements in procedures for electronic evaluation of ERTS imagery

Two visits of one day each by our scientific monitor (Tom Escue MSFC) have been completed. During these visits methods of imagery analysis and local capabilities were discussed. Members of the University Electrical Engineering Department were also present during these meetings.

- (e) A significant finding is the identification and delineation of a large soil association in Obion County, West Tennessee. These data are now being processed through the scanner and computer and will be included in our next report along with pictures of printout and imagery. Channel 7 appears to provide the most useful imagery related to soil differences.

(E72-10320) UTILIZATION OF ERTS DATA TO
DETECT PLANT DISEASES AND NUTRIENT
DEFICIENCIES, SOIL TYPES AND MOISTURE
LEVELS W.L. Parks, et al (Tennessee
Univ.) 27 Dec. 1972 4 p

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Soil types have been identified through the use of aircraft imagery. However, a soil association map appears to be the best that space imagery will provide. The exception to this will be large areas of a uniform soil type as occurs in the great plains.

- (f) The only published item to date is a picture of Channel 7 showing East Tennessee published in The Knoxville Journal on December 5, 1972.
- (g) We are well pleased with the efforts of the aircraft support unit from Houston as well as the ERTS imagery received and the assistance of our scientific monitor.
- (h) No changes in standing order forms have been made. However, it would be desirable to obtain selected digital tapes of some imagery from selected areas in the future.
- (i) Omit from this report.
- (j) ERTS aircraft support schedule NP3A (completed). One target site was 1 degree off.

Imagery Received - UN-650

No.	Date Received	Image date on film	MSS Channels	Area	Comments
1.	27 Oct. 72	9 Sept. 72	4,5,6,7	Lower East Tennessee	
2.	27 Oct. 72	13 Sept. 72	4,5,7	Lower West Tennessee	Channel 6 missing
3.	27 Oct. 72	13 Sept. 72	4,5,6,7	Upper West Tennessee	Channel 6 poor
4.	6 Nov. 72	10 Oct. 72	4,5,6,7	Upper West Tennessee	
5.	6 Nov. 72	10 Oct. 72	4,5,6,7	Lower West Tennessee	
6.	1 Dec. 72	15 Oct. 72	4,5,6,7	Lower East Tennessee	
7.	1 Dec. 72	15 Oct. 72	4,5,6,7	Upper East Tennessee	
8.	1 Dec. 72	5 Nov. 72	4,5,6,7	West Central Tennessee	
9.	7, Dec. 72	6 Nov. 72	4,5,7,7	Upper West Tennessee	Channel 4 missing. Rec two of Ch. 7
10.	7 Dec. 72	13 Sept. 72	4,5,6,7	Upper West Tennessee	A duplicate shipment but Ch. 6 still poor.
11.	15 Dec. 72	13 Sept. 72	6 only	Lower West Tennessee	Poor imagery
12.	15 Dec. 72	6 Nov. 72	4,5 only	Upper West Tennessee	
13.	Two shipments of 5 rolls total of microfilm of imagery available on request.				

Test sites

1. 36°24'N, 89°18'W - Upper West Tennessee
2. 35°39'N, 88°51'W - Upper and Lower West Tennessee
3. 35°04'N, 89°11'W - Lower West Tennessee
4. 36°20'N, 83°00'W - Upper East Tennessee
5. 35°10'N, 84°30'W - Lower East Tennessee

DATA ANALYSIS PLAN: UN-650 MMC#139

1. Imagery cataloged and filed according to date and target site.
2. A contact print is made of imagery for preliminary study in order to preserve quality of imagery.
3. An enlarged print is made of small areas of selected imagery for further visual study.
4. Selected small areas are scanned using a Tech/OPS Scandig high speed digital scanning microdensitometer with lattice scanning of 25, 50 or 100 microns quantitatively measuring density ranges up to 256 levels.
5. Digital output from the Tech/OPS scanner is evaluated through the use of an IBM 360/65 computer with the necessary software for computer evaluation.
6. Visual and computer evaluation of imagery are checked with ground truth to determine the extent of valid evaluation. In cases where visual or computer evaluation shows need for further ground truth evaluation, such will be accomplished within each target site.
7. Develop additional software and/or computer methods more suitable for ERTS imagery analysis. Present progress shows that aircraft imagery analysis methods need some refinement and adjustment in order to evaluate space imagery.